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Comparative Effects of Garlic, Yogurt, Beniseed Liquor and Fresh Orange Juice on Induced Type-1 Diabetes Mellitus in Rabbits using Streptozotocin

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Diabetes may best be described as a group of metabolic disorders in which there are high blood sugar levels over a prolonged period. Symptoms of this disease are majorly weight loss, thirst, frequent urination, and increased hunger. If left untreated, diabetes can cause many complications. Diabetes mellitus is a chronic, this condition that affects the body's ability to use the energy found in food. Here we can see three major types of diabetes: type 1 diabetes, type 2 diabetes, and gestational diabetes.Streptozotocin (STZ) was used to induce type-1 diabetes mellitus in animal models (twenty-one rabbits) at 60 mg/kg birth weight with two weekly booster doses to cause chronic diabetes in New Zealand White rabbits.

They were given single intravenous dose of STZ in 1mL citrate buffer having a pH 4.6 and the booster dose given after 7 days and 14 days respectively. The blood glucose level was monitored along with the clinical signs including changes in behavior and weight loss. Treatment commenced immediately after the third booster when the rise in blood sugar was observed (4 hours later).

They were treated with glucovance (a drug), fresh garlic extract, yogurt, beniseed liquor and orange juice for a period of 12 weeks (3 months) with the effect of the treatments checked on the glucose level of their blood, full blood count analysis using Mindray BC3300 auto-hematology analyzer and histopathology analysis of their pancreas. The results showed that the glucose level of the rabbits was within 70.02 ± 1.0 mg/dl at $p \leq 0.05$ before they were induced. The level rose to 187.33 ± 0.9 mg/dl after the 3rd booster dose of streptozotocin was given to the rabbits. Gross morphology of selected organs showed that the inducement caused discoloration of the kidneys, oedema of the pancreas and significant increase in weight of the heart at $p \leq 0.05$. There were no significant differences at $p \leq 0.05$ between Packed Cell Volume (PCV) of the control group and the group induced and treated with diabetes drug; while there were significant differences in the fibrinogen values for the experimental groups. The induced type 1 diabetes mellitus caused an increase in the basophils, monocytes, and neutrophils while it caused significant decrease in the percentage of lymphocytes.

Histopathologically, the inducement caused poor formation of the islet of Langerhans cells and dot necrotized cells. There is profuse hemorrhage from highly vascularized pancreatic acini surrounded by parenchyma fat cells. The group induced and treated with garlic extract showed some good features that not only depict a good and fast recovery from diabetes but showed some other health benefits of garlic. They are presence of well-formed pancreatic acini and cell infiltrations with well-spaced interstitial cells of the pancreas that shows active cell division of the pancreatic ducts and acini. There is splay and intrafaradization of the cracked pancreatic ducts. The presence of artifacts is seen at the anterior portion of the plate with well-formed interlobular and intralobular ducts. The effect of garlic extract as a good antidiabetic agent has been well established in this research. The curative strength of other foods such as yogurt and fruit extract has been proven in the findings of this research. Therefore, garlic has the most outstanding positive effect on diabetes and is recommended for people who are diabetic to feed on it or use it as food supplement.

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The effect of the induced type 1 diabetes on the glucose level as treatment progresses Week 0 shows the sugar level of the various groups before they were induced with streptozotocin. There were no significant differences in the result obtained for the various groups at $p \leq 0.05$ as they all have almost the same values of 70.02 ± 1.0 mg/dl except for groups 1 and 5 that had 71.13 ± 0.3 mg/dl. However, after the inducement with the booster dose of the streptozotocin in week one, the sugar level shoots up drastically with the results exceeding 187.33 ± 0.9 mg/dl and all the groups significantly different at $p \leq 0.05$. The control group was however almost constant in the value of the blood sugar with little fluctuations around 71.13 ± 0.3 mg/dl for the twelve weeks of the research. The other experimental groups showed variableness in the sugar levels at a different stage or week of the experiment. The group induced and treated with garlic extract is most significant among the experimental groups. Before the inducement, the sugar level of the group was 70.10 ± 0.2 mg/dl. The level rose to 187.33 ± 0.9 mg/dl after the third booster dose of streptozotocin was given to the rabbits. However, by the twelfth week of treatment with the garlic extract, the sugar level dropped to 74.12 ± 4.0 mg/dl.

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